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IMAGES IN INTERVENTION

Successful Percutaneous Anterograde Transcatheter Valve-in-Valve Implantation in the Mitral Position

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Transcatheter heart valve (THV) implantation with the valve-in-valve technique is a low-risk treatment option for patients with failing bioprosthetic valves (1).

A 71-year-old man with rheumatic mitral stenosis underwent mitral valve replacement 12 years ago with a 27-mm Carpentier-Edwards bioprosthesis (Edwards Lifesciences, Inc., Irvine, California). He presented with biventricular failure due to severe prosthetic mitral stenosis (valve area 0.8 cm^2, mean gradient 19 mm Hg), despite palliative valvuloplasty. Surgical risk was deemed unacceptably high (Logistic EuroScore = 44.8%; Society of Thoracic Surgeons predicted risk of mortality = 5.3%). Thus, he underwent transcatheter mitral valve-in-valve implantation by the transvenous-transeptal-anterograde approach, performed under local anesthesia and conscious sedation. After transseptal puncture, a Swan-Ganz catheter was manipulated across the mitral prosthesis and aortic

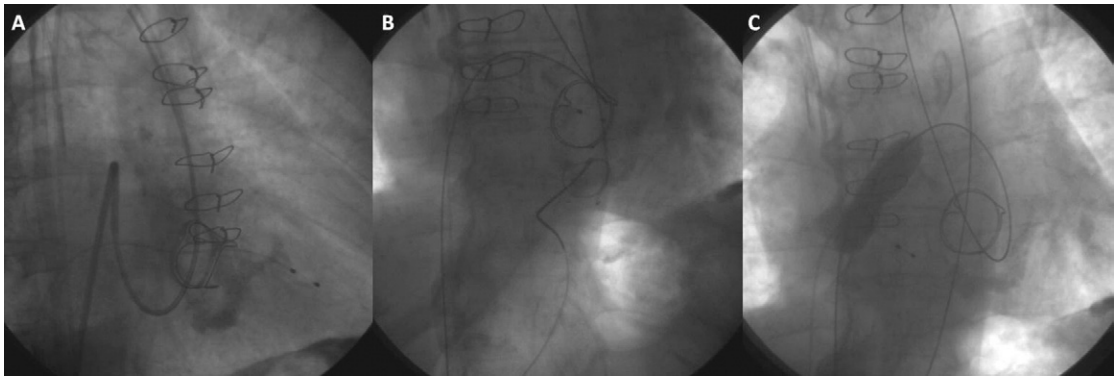

Figure 1. Crossing the Mitral Bioprosthesis and Preparation for THV Implantation

(A) Demonstrating the temporary pacing lead in the right ventricle, Swan-Ganz catheter manipulated across the Carpentier-Edwards mitral bioprosthesis and native aortic valve with the tip in the ascending aorta. **(B)** The useable length of the Amplatz Extra Stiff wire (Cook, Inc., Bloomington, Indiana), which formed the venous–arterial circuit, was extended by leaving the distal end snared by the gooseneck. **(C)** Second septal dilation with an 18 × 16 mm balloon.

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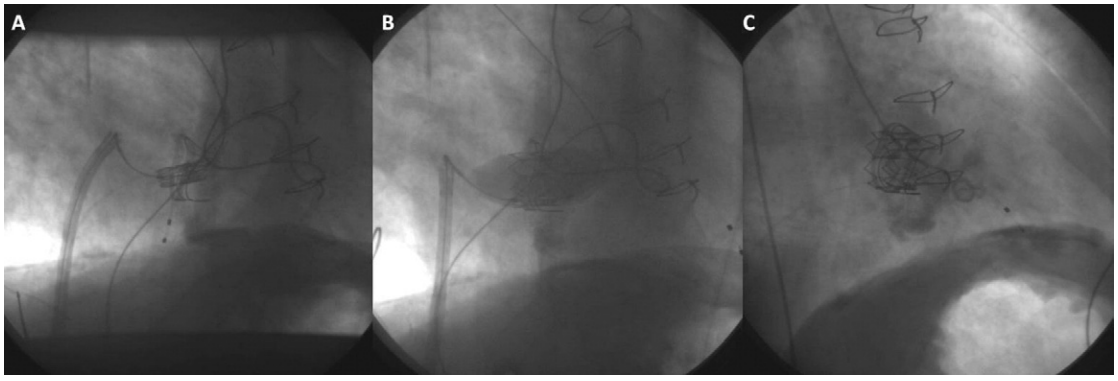

Figure 2. THV Positioning and Implantation

(A) Angiographic view perpendicular to the mitral bioprosthesis (55° right anterior oblique); the Novaflex delivery system positioned in the right atrium, and the middle of the Sapien XT (Edwards Lifesciences, Inc., Irvine, California) positioned at the sewing ring without complete coaxiality. **(B)** Valve implantation during rapid ventricular pacing with the Sapien XT (Edwards Lifesciences) moving spontaneously into a coaxial position. **(C)** Final position of the Sapien XT THV within the Carpentier-Edwards bioprosthesis (Edwards Lifesciences). Note how the Sapien XT overlaps the sewing ring of the surgical prosthesis.

valve into the ascending aorta. A 260-cm, 0.035-inch Amplatz Extra Stiff guidewire (Cook, Inc., Bloomington, Indiana) was advanced into the descending aorta and snared with a 25-mm gooseneck, creating a venous–arterial circuit (Fig. 1A). The gooseneck was left attached to the Amplatz wire to allow sufficient length of the wire system (Fig. 1B). A 24-F Edwards sheath was placed in the right femoral vein, and the atrial septum was dilated with a 10 × 40 mm balloon. A 26-mm Sapien XT valve (Edwards Lifesciences) premounted on the Novaflex system could not cross the septum; the THV was retrieved, and further sepal dilation with a larger balloon was performed (Fig. 1C). The THV was re-advanced, and despite several attempts, coaxial positioning within the bioprosthesis was impossible (Fig. 2A). During rapid ventricular pacing to minimize movement, slow and gradual balloon inflation resulted in the valve becoming coaxial with an excellent final position (Figs. 2B and 2C). Transesophageal echocardiography demonstrated a well-functioning Sapien XT valve (Edwards Lifesciences), minimal mitral gradient (3 mm Hg), and moderate intervalvular mitral regurgitation (i.e., between the bioprosthesis and Sapien XT). The patient tolerated the procedure well and was discharged 5 days later with marked symptomatic improvement. At 1-month follow-up, he was asymptomatic with no mitral regurgitation.

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